Claims: -

1. A microwave transceiver unit for use in a shaft furnace having an external wall and an inner wall spaced therefrom, said microwave transceiver unit comprising:-

first screen means transparent to microwave radiation, mountable to a suitable portal provided in said inner wall;

an elongate body having a configuration adapted for reversibly mounting to said external wall through an aperture provided in said external wall, said body having an axial dimension such that a first end of said body extends into said furnace from said aperture at least into proximity with said first screen, such as to permit relative movement between said body and said first screen means;

said body comprising microwave transmission/receiving means associated with said first end and operatively connectable to any one of a microwave generating means and microwave detection means;

wherein during operation of said microwave transceiver unit at least a portion of said screen is in aligned relationship with said microwave transmission/receiving means and wherein said screen is sufficiently large to maintain an aligned relationship between at least a portion of said first screen with respect to said microwave transmission/receiving means for a range of displacements of said first screen with respect to said microwave transmission/receiving means.

2. A microwave transceiver unit as claimed in claim 1, wherein the body comprises:

a metallic wave conductor coupled at a first end thereof to the transmission/receiving means, the second end of the conductor being operatively connectable to any one of a microwave generation means and a microwave detection means;

an insulation layer substantially surrounding at least said conductor;

an outer metallic layer substantially surrounding said insulation layer.

3. A microwave transceiver unit as claimed in claim 2, wherein the microwave transmission/receiving means comprises an antenna operatively connected to the wave conductor.

4. A microwave transceiver unit as claimed in claim 3, wherein the antenna is substantially frusto-conical having the larger end thereof as a transmitting/receiving face.

5. A microwave transceiver unit as claimed in claim 3, wherein the wave conductor and the antenna are integrally joined.

6. microwave transceiver unit as claimed in claim 3, wherein the wave conductor and the antenna are made from any suitable metal including any one of stainless steel, copper and brass or alloys thereof.

7. A microwave transceiver unit as claimed in claim 4, further comprising a second screen means covering the transmission/receiving face of the antenna, said second screen means being substantially transparent to microwave electromagnetic radiation.

8. A microwave transceiver unit as claimed in claim 7, wherein the first screen means and the second screen means are made from any suitable dielectric material.

9. A microwave transceiver unit as claimed in claim 2, wherein the insulation layer is substantially tubular.

10. A microwave transceiver unit as claimed in claim 2 to 9, wherein the outer metallic layer is made from steel.

11. A microwave transceiver unit as claimed in claim 1 wherein the body has a substantially cylindrical external profile.

12. A microwave transceiver unit as claimed in claim 11, further comprising a sleeve member having:

an external configuration adapted for sealingly mounting said sleeve in the aperture in the wall of the furnace; and

an internal configuration adapted for reversibly accommodating the body sealingly with respect thereto.

13. microwave transceiver unit as claimed in claim 12, wherein the sleeve member and the body each comprise suitable flanges which are mutually facing when said sleeve member and said body are mounted together.

14. A microwave transceiver unit as claimed in claim 13, further comprising a suitable sealing gasket adapted for accommodation between the mutually facing flanges for sealing the sleeve member with respect to the body.

15. A microwave transceiver unit as claimed in claim 1, wherein the range of displacements is correlated to the thermal expansion of the inner wall with respect to the outer wall.

16. A microwave transceiver unit as claimed in claim 1, wherein the body is distanced from the first screen means sufficiently to permit displacement

of said first screen means with respect to the microwave transmission/receiving means.

17. A microwave transceiver unit as claimed in claim 1, wherein the body comprises displacement means in abutting contact with one of the inner wall and the first screen means to permit displacement of said first screen means with respect to the microwave transmission/receiving means.

18. A microwave transceiver unit as claimed in claim 17, wherein the displacement means comprises at least one wheel mounted for rotation with respect to the body, wherein said wheel is in rotatable contact with at least one of the inner wall and the first screen means.

19. A microwave transceiver unit as claimed in claim 18, further comprising at least one suitable rail on at least one of the inner wall and the first screen means corresponding to the at least one wheel, wherein during operation of said transceiver unit, said at least one wheel is in rotatable contact with a corresponding said rail.

20. Apparatus for monitoring waste in a waste converting apparatus, said waste converting apparatus comprising a waste processing chamber having a waste inlet port at an upper longitudinal end thereof and an

external peripheral wall, and further comprising an internal wall extending from said inlet into said chamber to a predetermined depth such as to a form waste conduit and a space between an outside of said internal wall and an inside of at least a part of said external wall, said apparatus comprising at least one pair of microwave transceiver units, comprising at least one said microwave transceiver unit as claimed in claim 1, wherein for each said pair :

said microwave transceiver units are arranged in opposed horizontal relationship with respect to said upper longitudinal end;

the body of each said microwave transceiver unit is sealingly accommodated in an aperture formed in said outer peripheral wall;

the conduit comprises a pair of portals comprising a first screen means, said portals being located on said conduit at positions such that each said first screen means is aligned with a corresponding one of said microwave transceiver units of said pair; and

one said transceiver unit is operatively connectable to a suitable microwave generating means, the other said transceiver unit is operatively connectable to a suitable microwave detection means.

21. Apparatus for monitoring waste as claimed in claim 20, wherein the internal wall is a waste conduit in the form of an internal peripheral wall extending from the inlet into the chamber to a predetermined depth such

as to form a peripheral space between an outside of the conduit and an inside of the external wall.

22. Apparatus for monitoring waste as claimed in claim 20, wherein at least one pair of microwave transceiver units comprises a regular microwave transceiver unit.

23. Apparatus for monitoring waste as claimed in claim 20, comprising more than one pair of microwave transceiver units, wherein each said pair is located at a different height along the depth of the conduit.

24. Apparatus for monitoring waste as claimed in claim 20, comprising more than one pair of microwave transceiver units, wherein each said pair is located at a different angular disposition with respect to a longitudinal axis of the conduit.

25. Apparatus for monitoring waste as claimed in claim 24, wherein adjacent pairs are arranged in orthogonal relationship with respect to a longitudinal axis of the conduit.

26. System for monitoring waste in a waste converting apparatus comprising at least one apparatus as claimed in claim 20, wherein for each pair of transceiver units, one said transceiver unit is operatively connected to a

suitable microwave generation means, and wherein the other transceiver unit of said pair is operatively connected to a suitable microwave detection unit.

27. System as claimed in claim 26, further comprising suitable control means operatively connected to the microwave generation means and to the microwave detection unit.

28. A method for monitoring the level of waste in a shaft furnace having an external wall and an inner wall spaced therefrom, comprising:

(a) providing at least at one location on said shaft furnace:

- an aperture in said outer wall;
- an aperture in said inner wall and covering the same with suitable screen means; and
- a first suitable microwave transmission/receiving means through said aperture into proximity with said screen means, such that a part of said transmission/receiver means is in sealing contact with said outer wall;

(b) providing a second microwave transmission/receiving means substantially diametrically opposed to said first transmission/receiving means;

(c) transmitting suitable microwave radiation via one of said first or second microwave transmission/receiving means and

receiving a received radiation with the other one of said first or second microwave transmission/receiving means; and

(d) comparing the intensity of the received radiation with the transmitted radiation to determine the level of waste in said shaft furnace by relating said comparison of intensities to a threshold value.

29. The method of claim 28, wherein when the intensity of the received radiation is below a predetermined threshold value it is determined that the level of waste is substantially below the level of the first microwave transmission/receiving means.

30. The method of 28, wherein when the intensity of the received radiation is at or above a predetermined threshold value it is determined that the level of waste is substantially at or above the level of the first microwave transmission/receiving means.

31. The method of claim 28, wherein a second pair of microwave transmission/receiving means is provided at a location longitudinally displaced from the first and second microwave transmission/receiving means, and wherein a waste flow rate in the furnace is determined by determining the time interval between the point at which it is determined that one of said pairs

of microwave transmission/receiving means is no longer detecting waste and the point at which the next pair of said microwave transmission/receiving means is no longer detecting waste thereat.

32. The method of claim 28, wherein the threshold value may be controlled as desired.

33. The method of claim 32, wherein the threshold value is adjusted according to the general composition of the waste being introduced into the furnace.

34. A microwave transceiver unit for use in a shaft furnace, substantially as herein described with reference to the accompanying figures.

35. Apparatus for monitoring waste in a waste converting apparatus, substantially as herein described with reference to the accompanying figures.

36. System for monitoring waste in a waste converting apparatus, substantially as herein described with reference to the accompanying figures.

37. Method for monitoring waste in a waste converting apparatus, substantially as herein described with reference to the accompanying figures.